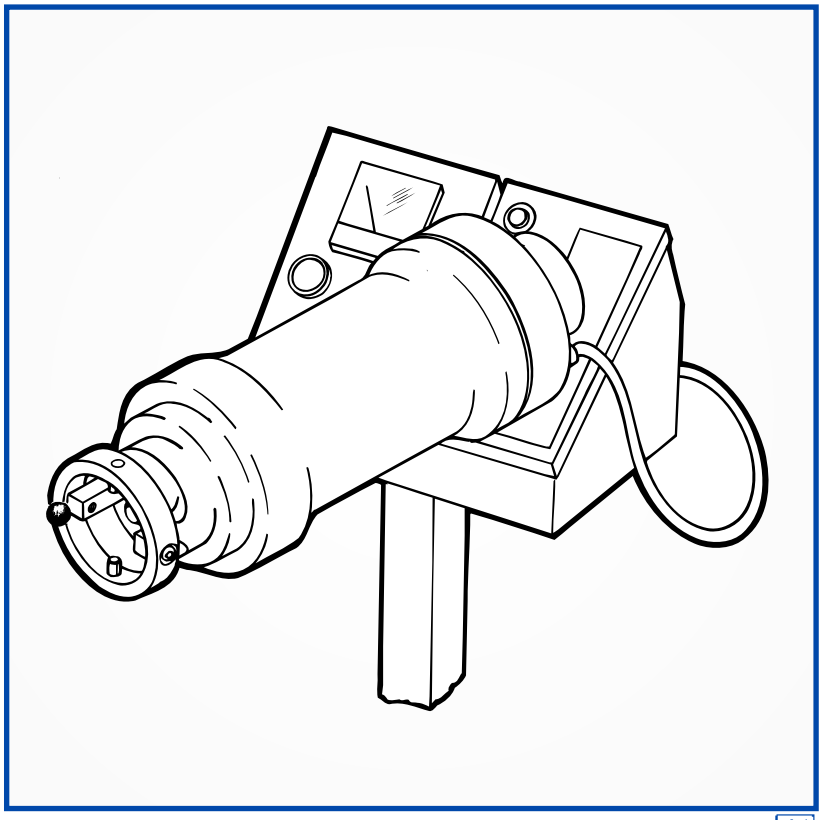
Installation, Setup and Operation

INSTRUCTIONS



for

SUNNEN® MODULAR POWER FEED SYSTEMS

Model: MPS-10 & MPS-11

READ THE FOLLOWING INSTRUCTIONS THOROUGHLY AND CAREFULLY BEFORE UNPACKING, INSPECTING, OR INSTALLING THE SUNNEN® MODULAR POWER FEED SYSTEMS.

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SUNNEN® PRODUCTS COMPANY • 7910 MANCHESTER AVENUE • ST. LOUIS, MO 63143, U.S.A. • PHONE: 314-781-2100

GENERAL INFORMATION

The Sunnen® equipment has been designed and engineered for a wide variety of parts within the capacity and limitation of the equipment. With proper care and maintenance this equipment will give years of service.

READ THE FOLLOWING INSTRUCTIONS CAREFULLY AND THOROUGHLY BEFORE UNPACKING, INSPECTING, OR INSTALLING THIS EQUIPMENT.

IMPORTANT: Read any supplemental instructions BEFORE installing this equipment. These supplemental instructions give you important information to assist you with the planning and installation of your Sunnen equipment.

Sunnen Technical Service Department is available to provide telephone assistance for installation, programming, & troubleshooting of your Sunnen equipment. All support is available during normal business hours, 8:00 AM to 4:30 PM Central Time.

Review all literature provided with your Sunnen equipment. This literature provides valuable information for proper installation, operation, and maintenance of your equipment. Troubleshooting information can also be found within the Instructions. If you cannot find what you need, call for technical support.

Where applicable, programming information for your Sunnen equipment is also included. Most answers can be found in the literature packaged with your equipment.

Help us help you. When ordering parts, requesting information, or technical assistance about your equipment, please have the following information available:

- Have ALL MANUALS on hand. The Customer Services Representative or Technician will refer to it.
- Have Model Number and Serial Number printed on your equipment Specification Nameplate.
- Where Applicable: Have Drive model and all nameplate data. Motor type, brand, and all nameplate data.

For Troubleshooting, additional information may be required:

- Power distribution information (type - delta, wye, power factor correction; other major switching devices used, voltage fluctuations)
- Installation Wiring (separation of power & control wire; wire type/class used, distance between drive and motor, grounding).
- Use of any optional devices/equipment between the Drive & motor (output chokes, etc.).

For fast service on your orders call:

Sunnen Automotive Customer Service toll free at: 1-800-772-2878

Sunnen Industrial Customer Service toll free at: 1-800-325-3670

Customers outside the USA, contact your local authorized Sunnen Distributor.

Additional information available at: http://www.sunnen.com or e-mail: sunnen@sunnen.com

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ESD PREVENTION REVIEW

Let's review the basics of a sound static control system and its effective implementation. First, in the three step plan:

1. Always ground yourself when handling sensitive components or assemblies.
2. Always use a conductive or shielded container during storage or transportation. These materials create a Faraday cage which will isolate the contents from static charges.
3. Open ESD safe containers only at a static safe work station.

At the static safe work station, follow these procedures before beginning any work:

A. Put on your wrist strap or foot grounding devices.

B. Check all grounding cords to make sure they are properly connected to ground, ensuring the effective dissipation of static charges.

C. Make sure that your work surface is clean and clear of unnecessary materials, particularly common plastics.

D. Anti-static bubble wrap has been included for use at the machine when an ESD safe workstation is not available.

You are now properly grounded and ready to begin work. Following these few simple rules and using a little common sense will go a long way toward helping you and your company in the battle against the hazards of static electricity. When you are working with ESD sensitive devices, make sure you:

GROUND

ISOLATE

NEUTRALIZE

SUNNEN® LIMITED PRODUCT WARRANTY

Sunnen® Products Company and its subsidiaries (SPC) warrant that all new SPC honing machines, gaging equipment, tooling, and related equipment will be free of defects in material and/or workmanship for a period of one year from the date of original shipment from SPC.

Upon prompt notification of a defect during the one-year period, SPC will repair, replace, or refund the purchase price, with respect to parts that prove to be defective (as defined above). Any equipment or tooling which is found to be defective from improper use will be returned at the customer's cost or repaired (if possible) at customer's request. Customer shall be charged current rates for all such repair.

Prior to returning any SPC product, an authorization (RMA#) and shipping instructions must be obtained from the Customer Service Department or items sent to SPC will be returned to the customer.

Warranty Limitations and Exclusions This Warranty does not apply to the following:

- Normal maintenance items subject to wear and tear: (belts, fuses, filters, etc).
- Damages resulting from but not limited to:
  - › Shipment to the customer (for items delivered to customer or customer's agent F.O.B., Shipping Point)
  - › Incorrect installation including improper lifting, dropping and/or placement
  - › Incorrect electric power (beyond +/- 10% of rated voltage) including intermittent or random voltage spikes or drops
  - › Incorrect air supply volume and/or pressure and/or contaminated air supply
  - › Electromagnetic or radio frequency interference from surrounding equipment (EMI, RFI)
  - › Storm, lightning, flood or fire damage
  - › Failure to perform regular maintenance as outlined in SPC manuals
  - › Improper machine setup or operation causing a crash to occur
  - › Misapplication of the equipment
  - › Use of non-SPC machines, tooling, abrasive, fixturing, coolant, repair parts, or filtration
  - › Incorrect software installation and/or misuse
  - › Non-authorized customer installed electronics and/or software
  - › Customer modifications to SPC software

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Shipping Damages

Except in the case of F.O.B., Buyer's destination shipments, SPC will not be liable for any settlement claims for obvious and/or concealed shipping damages. The customer bears the responsibility to unpack all shipments immediately and inspect for damage. When obvious and/or concealed damage is found, the customer must immediately notify the carrier's agent to make an inspection and file a claim. The customer should retain the shipping container and packing material.

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Any alteration or reverse engineering of the software is expressly forbidden and is in violation of this agreement.

SPC reserves the right to update the software covered by this agreement at any time without prior notice and any such updates are covered by this agreement.

SAFETY INSTRUCTIONS

READ FIRST

This machine, like any equipment, may be dangerous if used improperly. Please read all warnings and instructions before attempting to use this Unit.

Always disconnect power at main enclosure before servicing Unit.

Always wear eye protection when operating this Unit.

DO NOT attempt any repair or maintenance procedure beyond those described in this book. Contact your Sunnen® Field Service Engineer or Technical Services Representative for repairs not covered in these instructions.

DO NOT attempt to defeat any safety device on this machine or on any of the optional equipment.

Unit MUST be operated at least 18 in. (457 mm) above floor.

WARNING: Unit operates at EXTREMELY high temperatures.

CE Indicates CE version ONLY.

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GENERAL INFORMATION & SPECIFICATIONS

Sunnen® Modular Power Feed System

MODEL:	MPS-10	MPS-11
Electrical Requirements:	115 V, 60 Hz, 1 Ph	115 V, 50/60 Hz, 1 Ph
Color:	Pearl Gray	Pearl Gray

INTRODUCTION

This Instruction Manual is provided to give the information required to install and operate the Sunnen® Modular Power Feed System.

Model MPS-10 is designed for power-stroked machines equipped with electrl'c spindle drive motors. (Use Appendix A with the following instructions.)

Model MPS-11 is designed for power-stroked machines equipped with hydraulic spindle drive motors. (Use Appendix B with the following instructions.)

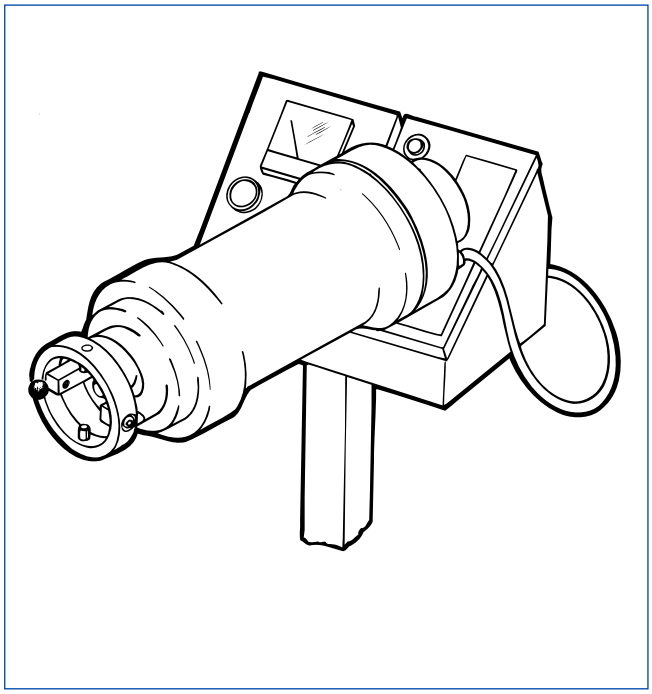
When ordering parts for, or requesting information about your Unit, include the model and serial numbers of your Machine.

READ THE FOLLOWING INSTRUCTIONS THOROUGHLY AND CAREFULLY BEFORE UNPACKING, INSPECTING, OR INSTALLING SUNNEN® MODULAR POWER FEED SYSTEM.

SECTION 1
INSTALLATION

GENERAL

This section is designed to aid the user in unpacking, inspecting, and installing of Sunnen® MPS Modular Power Feed Systems, Models MIPS-10 and MPS-11 *(see Figure l-l)*.



FIGURE•1-1, Modular Power Feed System

SUGGESTED TOOLS & MATERIALS

The following tools and materials are suggested for installing the Sunnen Modular Power Feed System:

Wire Cutters/Strippers
Screw Driver (Std. &Jewelers)
Hex Key (l/8" & l/4")
Slip-Joint Pliers (Small Nose)
Open End Wrench (7/l)
Electrical Tape

UNPACKING & INSPECTING

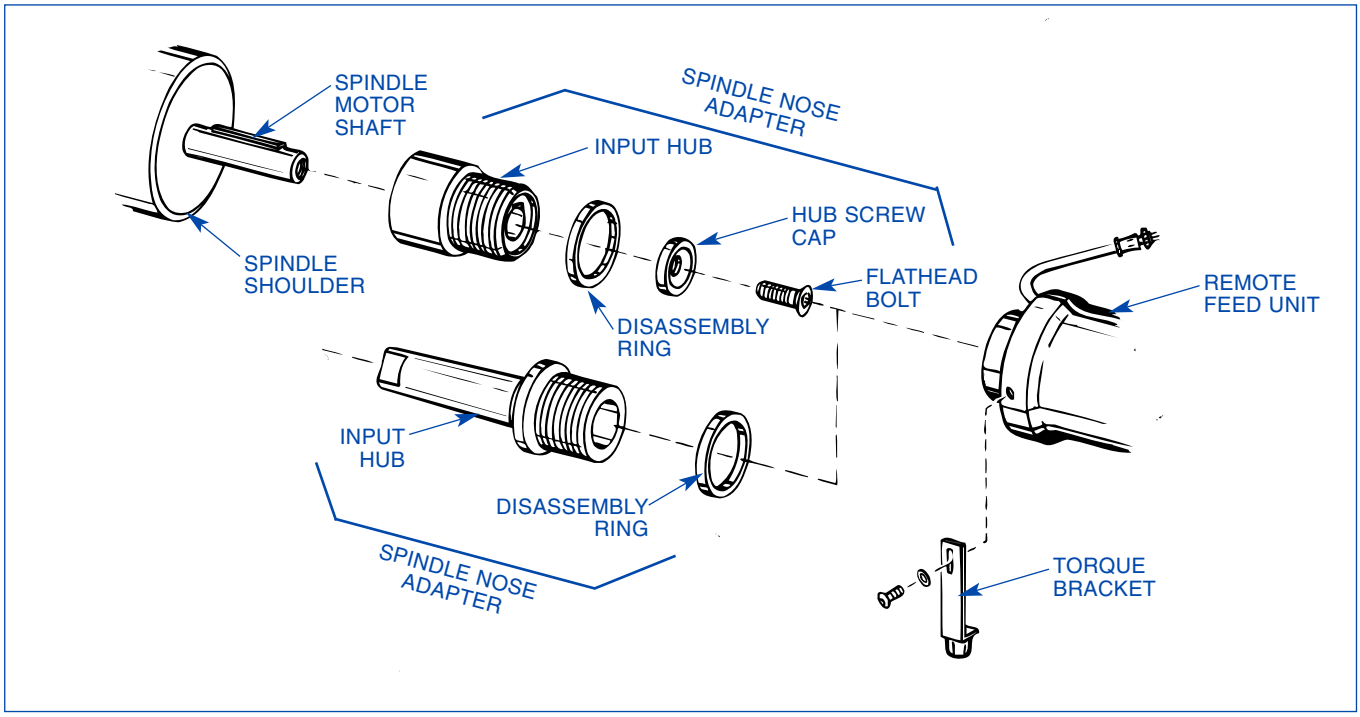
Unpack Modular Power Feed System and inspect for signs of damage resulting from the improper handling by carrier. If damage is evident, immediately file a claim with the.carrier.

WARNING

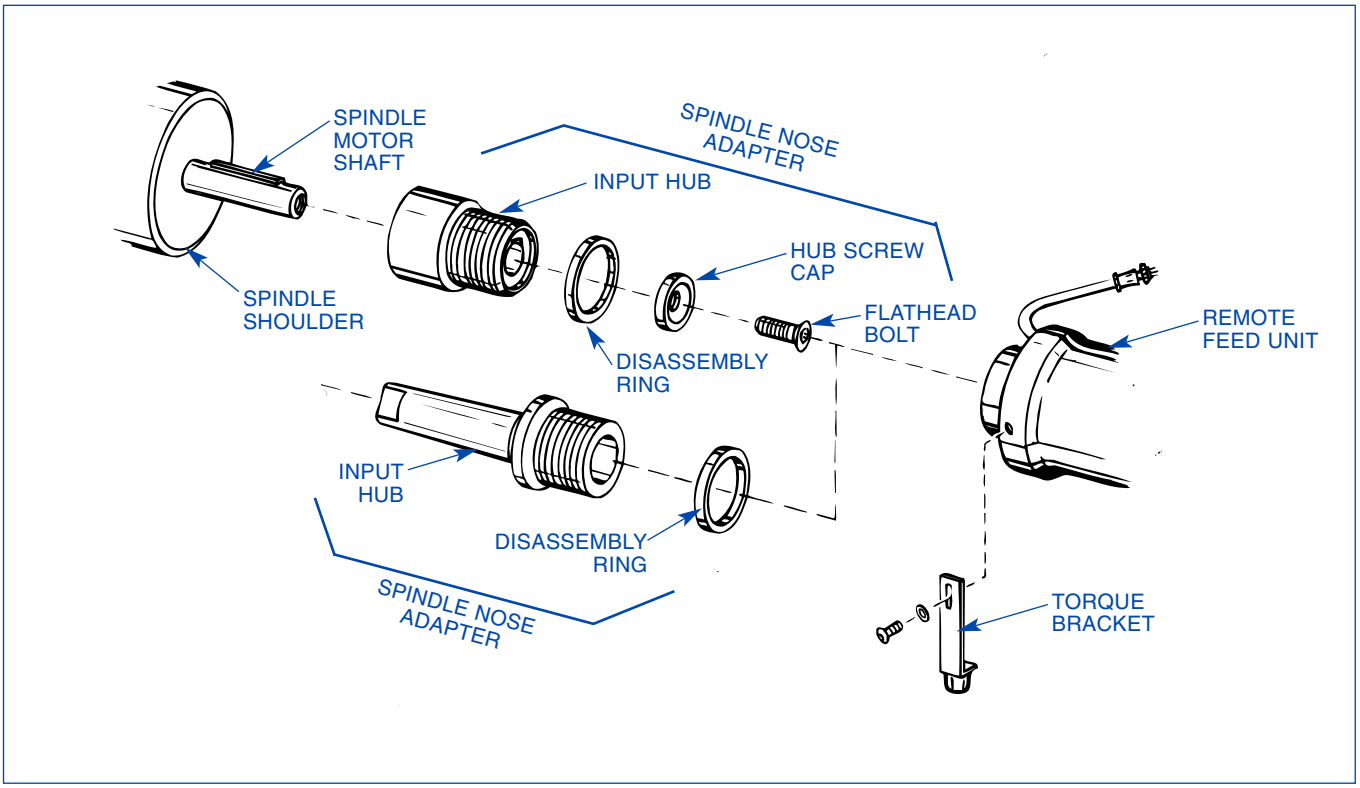
Turn electrical power off at main buss box or main power source when performing any maintenance on machine's electrical system.

INSTALLING SPINDLE NOSE ADAPTER

The following procedure is for installing Spindle Nose Adapters *(see Figure 1-2)* on machines equipped with 32mm or 40mm drive shafts *(see step 1)* or on machines equipped with #4 or #5 "Morse" Tapered Drive *(see step 2)*. Consult your local Sunnen Field Engineer if your machine drive assembly differs from the following.



FIGURE•1-2, Remote Feed Unit



FIGURE•1-3, Remote Feed Unit

STEP 1- Spindle Nose Adapter (32/40mm):

• Align Keyway in Input Hub with the key on the Spindle Motor Shaft and slide hub onto shaft.

• Place Hub Screw Cap (chamfer side out) on end of Input Hub and secure with Flathead Bolt to Spindle Motor Shaft. Tighten bolt (30 to 40 ft-lbs / 40-50 newton meters) until hub is firmly seated against Spindle Shoulder.

STEP 2- Spindle Nose Adapter (#4/5 Morse Taper):

• Loosen Locking Nut on Drive Assembly.

• Slide "Morse" Tapered Drive out of the machine's spindle taper.

• Remove Locking Nut.

• Remove Key.

• Install Locking Nut on Input Hub.

• Align Slots in Locking Nut and Input Hub, and install Key.

• Install Input Hub in the machine's spindle taper.

• Tighten Locking Nut.

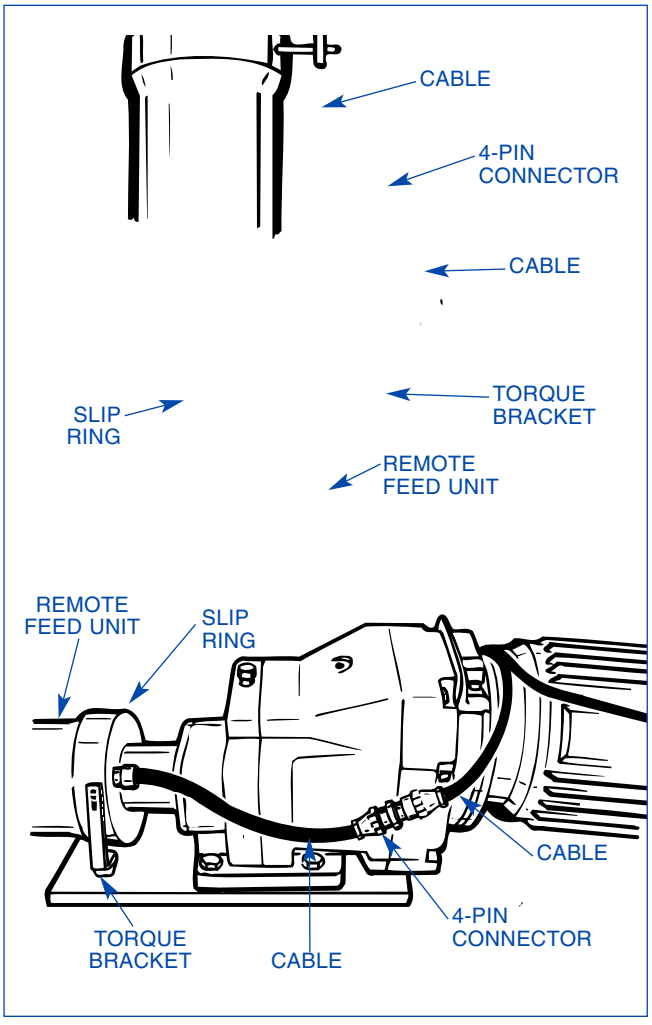
INSTALLING REMOTE FEED UNIT

CAUTION

DO NOT install Remote Feed Unit unless Disassembly Ring is in place on Input Hub.

1. Install Disassembly Ring on Input Hub *(see Figure 1-3)*.

2. Install Remote Feed Unit by turning onto threaded Input Hub. Hand tighten.



FIGURE•1-4, Torque Bracket

3. Install Torque Bracket on Remote Feed Unit *(see Figure l-4)*.

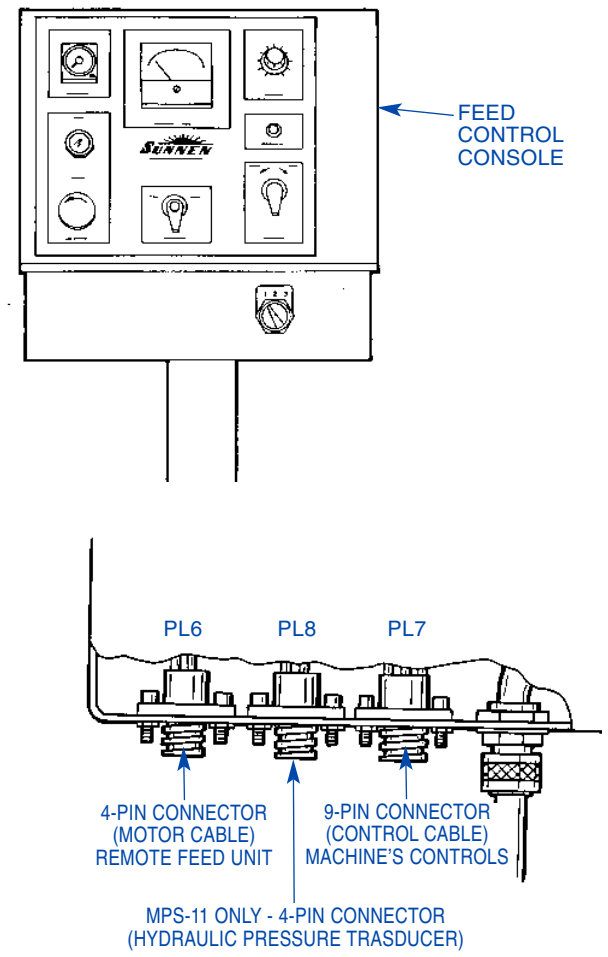
NOTE: A Torque Bracket must be installed to prevent the Slip Ring on the Remote Feed Unit from turning while in operation. (If Torque Bracket supplied with the system does not work on your machine, you will need to make a bracket for your machine.)

FEED CONTROL CONSOLE

1. Position the Feed Control Console in a convenient location.

2. Attach the Motor and Control Cables to bottom rear of the Feed Control Console *(see Figure 1-5)*.

- PL6 - Motor Cable (4.Pin Connector) is for the Remote Feed Unit.
- PL7 - Control Cable @Pin Connector) is for control signal output, Machine's Main Electrical Control Panel.
- PL8 - Used with MIPS-11 ONLY - Transducer Cable (4.Pin Connector) is for the Hydraulic Pressure Transducer.



FIGURE•1-5, Feed Control Console

REMOTE FEED UNIT CONNECTION

Route Motor Cable between Feed Control Console and Remote Feed Unit. Attach to 4-Pin Connector on Remote Feed Unit *(refer to Figure l-4)*.

NOTE: Ensure cable is free to move with the stroking action of the machine.

INSTALLING TRANSFORMER OR TRANSDUCER

l. Install Current Transformer *(see Appendix A)* on machines equipped with electric spindle drive motors or a Hydraulic Pressure Transducer *(see Appendix B)* on machines equipped with hydraulic spindle drive motors.

Appendix A - Current Transformer (Electric Spindle Drive Motor)

Appendix B - Hydraulic Pressure Transducer (Hydraulic Spindle Drive Motor)

2. Route the Control Cable to the Machine's Main Electrical Control Panel.

NOTE: Use Cord Connector where cable enters the panel to provide an oil tight connection.

WIRING OPTIONS

When connecting cables to the Machine's Main Electrical Control Panel, refer to the Wiring Diagram included in this instruction package. The Feed Control Console can be wired for one of two modes of operation. In either mode, the STOP Button on the Feed Control Console is fully functional and will stop all machine and feed functions when depressed. The modes are as follows:

MASTER CONTROL MODE - Wiring Options 1A and 1B allow the Feed Control Console to control BOTH machine and feed functions. (Honing Cycle Start Button is used to start both machine and feed functions. Honing cycle stops when Honing Timer times out, when STOP Button is depressed, or when Machine's Stop Button is depressed.) See *step 1*, Wiring Option 1A (when control circuit exists on the machine) or *step 2*, Wiring Option 1B (when NO control circuit exists on the machine).

SLAVE CONTROL MODE - Wiring Option 2 *(see step 3)* allows the Machine's Controls to control BOTH machine and feed functions. (The feed cycle is started and stopped in conjunction with the machine's spindle, from an auxiliary contact signal from the machine. The Honing Cycle START Button and Honing Timer on the Feed Control Console are not functional in this mode.)

NOTE: The System requires 115V, 1-Ph input - Two optional Transformers are available from Sunnen:

PEM-516A (Domestic):	**PEM-517A (Export):**
208/230/460V Primary	220/380/440V Primary
115V Secondary	115V Secondary
250 Volt/Amps	250 Volt/Amps

1. WIRING OPTION lA, (Master Control Mode) for machine on which a Control Circuit Exists *(see Figure 1-6)*.

WARNING

These are general wiring instructions. Consult with your local sunnen field engineer, or sunnen products company, for specific instructions for wiring your machine. Improper wiring could result in personal injury or damage to the equipment.

A. Connect Yellow Wire (MPS Control Cable) and Violet Wire (MPS Control Cable) in series with Machine's Control Circuit Fuse (or Machine's EMERGENCY STOP Switch) as follows:

• Disconnect Wire from Machine's Control Circuit Fuse and connect to Violet Wire (MPS Control Cable). Connect Yellow Wire (MPS Control Cable) to Machine's Control Circuit Fuse.

B. Replace the Machine's Hold-In Contact with the MPS' Auxiliary Contact as follows:

• Disconnect Wire(s) from one Terminal of the Machine's Cycle Hold-In Contact and connect to Orange Wire (MPS Control Cable).

• Connect Black Wire (MPS Control Cable) to the open Terminal on the Machine's Cycle Hold-In Contact.

• Disconnect Wire(s) from second Terminal of the Machine's Cycle Hold-In Contact and connect to Green Wire (MPS Control Cable).

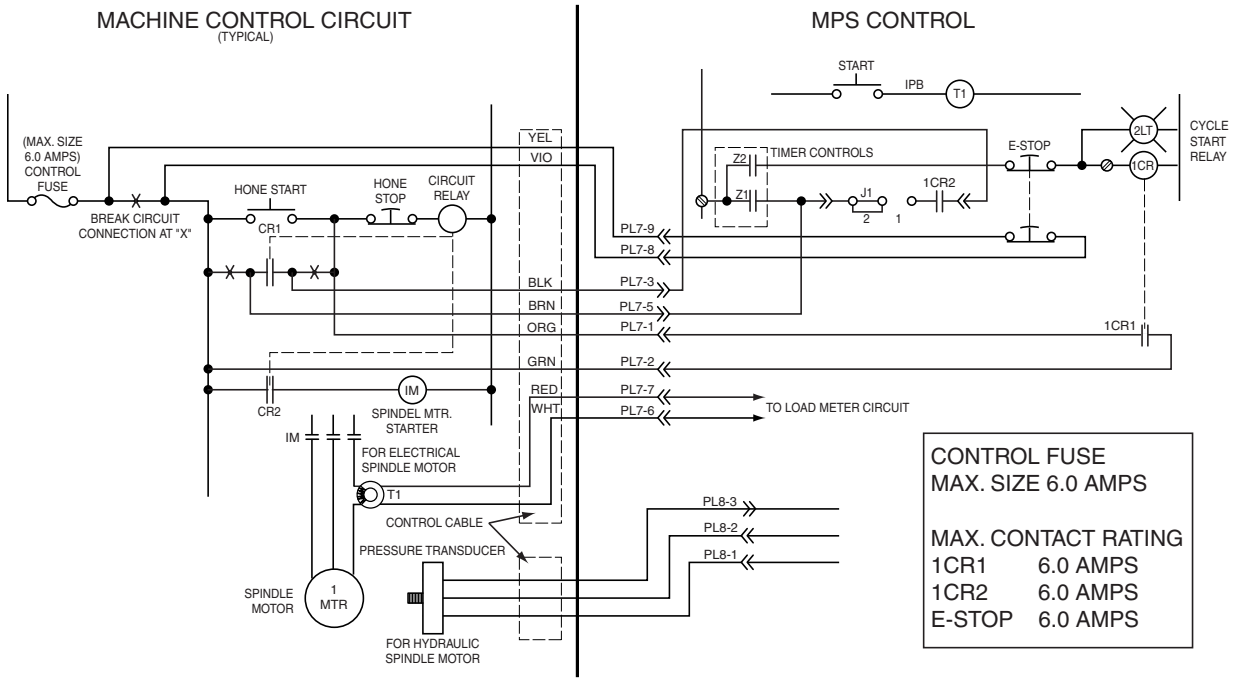
• Connect Brown Wire (MPS Control Cable) to the open Terminal on the Machine's Cycle Hold-In Contact.

C. Individually tape off ends of remaining wires.

THEORY OF OPERATION

When the MPS Honing Cycle START Button (1 PB) is depressed, the Honing Timer (TI) will be automatially set to the desired (preset) honing time. This will close Timer Contacts ZI and 22. Contact 22 closes onlymomentarilywhile START Button (1 PB) is being depressed; Contact ZI remains closed during the entire honing cycle. The closing of Contact 22 energizes Relay 1 CR. Contact 1 CR1 , which is wired in parallel with the Machine's START Switch, energizes Machine's Cycle Relay (CR). Machine's Contact CRI, which is wired in series with Timer Contact ZI , closes - providing a holding circuit for MPS Cycle Relay 1 CR; Machine's Contact CR2 also closes, energizing Machine's Contactor 1 M, which turns the spindle ON.

When Honing (TI) times out, or the MPS STOP Button or the Machine's STOP depressed, cycle will STOP.



FIGURE•1-6, Wiring Option 1A

2. WIRING OPTION lB, (Master Control Mode) for machine on which NO Control Circuit Exists *(see Figure l-7)*.

WARNING

These are general wiring instructions. Consult with your local sunnen field engineer, or sunnen products company, for specific instructions for wiring your machine. Improper wiring could result in personal injury or damage to the equipment.

A. Connect Yellow Wire (MPS Control Cable) and Violet Wire (MPS Control Cable) in series with Machine's Control Circuit Fuse (or Machine's EMERGENCY STOP Switch) as follows:

- Disconnect Wire from Machine's Control Circuit Fuse and connect to Violet Wire (MPS Control Cable).
- Connect Yellow Wire (MPS Control Cable) to Machine's Control Circuit Fuse.

B. The Honing Machine may be started and stopped directly through the normally open auxiliary contacts of the MPS's Cycle Relay by wiring as follows:

NOTE: Green and Orange Wires (MPS Control Cable) are connected beween the Machine's STOP Switch and Motor Starter Coil. Black and Brown Wires (MPS Control Cable) are connected to an Auxiliary Contact to provide an external hold-in from the Machine.

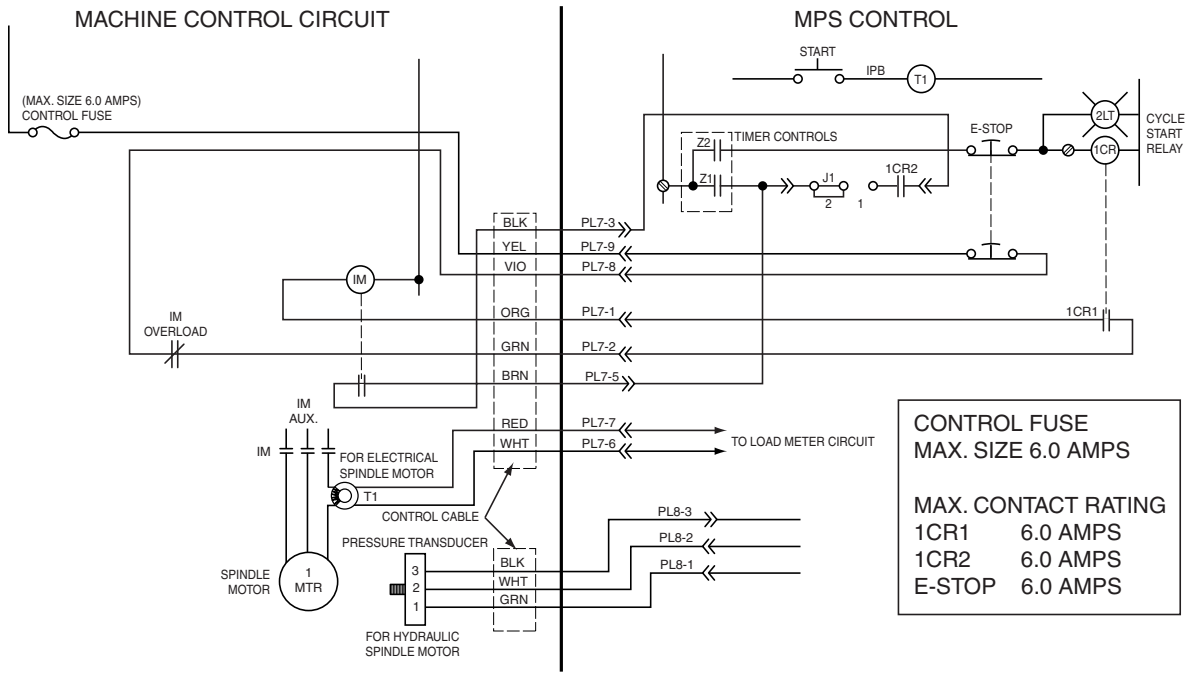
- Connect Orange Wire (MPS Control Cable) to the Machine's Wire leading to the Motor Starter Coil.
- Connect Green Wire (MPS Control Cable) to the Machine's Wire leading to the STOP Switch.
- Connect Black Wire (MPS Control Cable) to a Terminal on the Auxiliary Contact in the Machine's Cycle Start Circuitry.
- Connect Brown Wire (MPS Control Cable) to second Terminal on the same Auxiliary Contact in the Machine's Cycle Start Circuitry.

C. Individually tape off ends of remaining wires.

THEORY OF OPERATION

When the MPS Honing Cycle START Button (1 PB) is depressed, the Honing Timer (TI) will be automatically set to the desired (preset) honing time. This will close Timer Contacts 21 and 22. Contact 22 closes only momentarily while START Button (1 PB) is being depressed; Contact 21 remains closed during the entire honing cycle. The closing of Contact 22 energizes Relay 1 CR. Auxiliary Cycle Relay Contact 1 CR1 is wired in series with the spindle motor starter or hydraulic pump starter, energizing Machine's Contactor 1 M which turns the spindle ON.

MPS Cycle Relay 1 CR remains energized until the Honing Timer (TI) times out; or either the MPS STOP Button or the Machine's STOP Switch is depressed. The honing cycle will STOP.When Honing (TI) times out, or the MPS STOP Button or the Machine's STOP depressed, cycle will STOP.



FIGURE•1-7, Wiring Option 1B

3. WIRING OPTION 2, Slave Control Mode *(see Figure l-8)*.

WARNING

These are general wiring instructions. Consult with your local sunnen field engineer, or sunnen products company, for specific instructions for wiring your machine. Improper wiring could result in personal injury or damage to the equipment.

A. Connect Yellow Wire (MPS Control Cable) and Violet Wire (MPS Control Cable) in series with the Control Circuit Fuse (or in series with the Machine's STOP Switch) as follows:

- Disconnect Wire from Machine's Control Circuit Fuse and connect to Violet Wire (MPS Control Cable).
- Connect Yellow Wire (MPS Control Cable) to Machine's Control Circuit Fuse.

B. Connect Black Wire (MPS Control Cable) to a Terminal on the Normally Open Auxiliary Contact in the Machine's Cycle Start Circuitry (either the Cycle Start Relay or Spindle Contactor).

C. Connect Blue Wire (MPS Control Cable) to another Terminal on the same Normally Open Auxiliary Contact in the Machine's Cycle Start Circuitry.

D. Individually tape off ends of remaining wires.

THEORY OF OPERATION

When the Machine's Controls are used to control BOTH the machine and feed functions, MPS control is started and stopped through an Auxiliary Contact closure supplied by the Machine's Controls (Master Controls). The Auxiliary Contact can be either a normally open contact on the Cycle Relay or on the Spindle Motor Starter. When the Auxiliary Contact closes, it overrides the MPS Timer Contacts and energizes MPS relay 1 CR to place the MPS control in cycle. When the Machine cycle stops, the Auxiliary Contact opens and allows the 1 MPS control to drop out of cycle (honing cycle will stop). Depressing either the MPS STOP Button or the Machine's STOP Switch will stop all machine and feed functions.

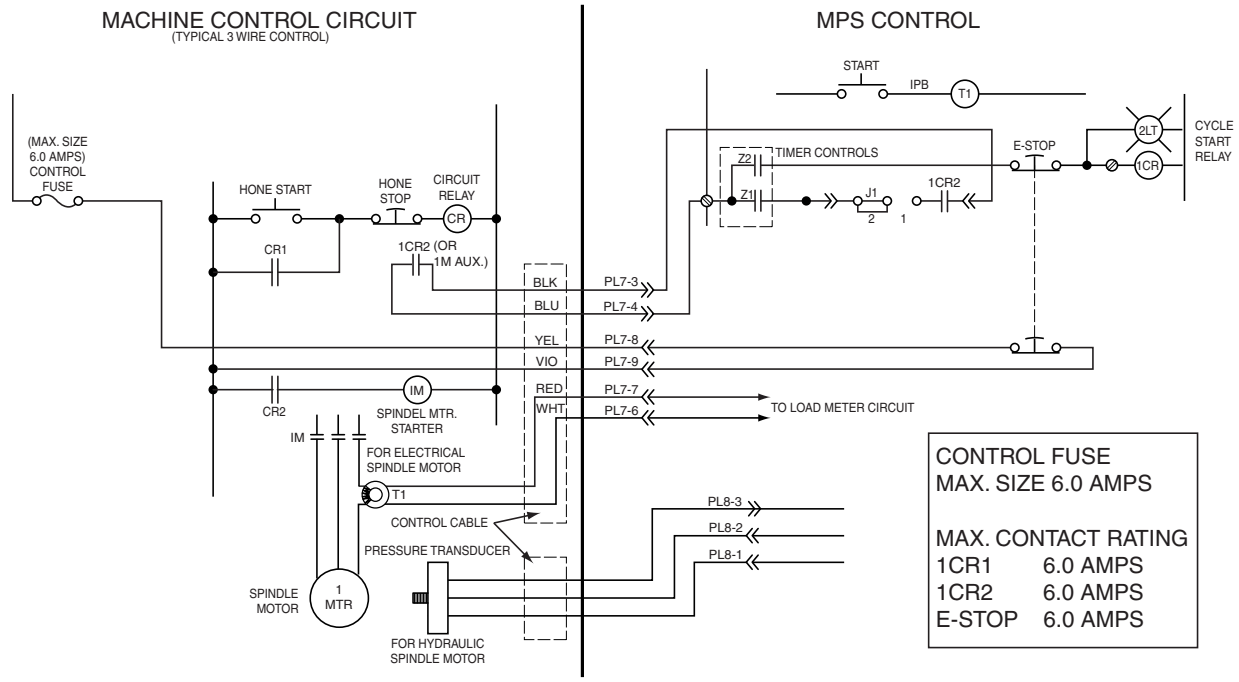


FIGURE 1-8, Wiring Option 2

SECTION 2
PREPARING FOR OPERATION

GENERAL

This section is designed to aid the user in making adjustments to the Modular Power Feed System before the System and the Machine can be operated.

MAJOR CONTROLS

For location of controls, *see Figure 2-1*; for the function of the controls, *refer to Table 2-1*.

TABLE 2-1, Control Functions

NOMENCLATURE	DESCRIPTION	FUNCTION
SPINDLE LOAD	Meter	Indicates the percentage of spindle load produced
HONING TIME	Timer[1]	Sets the length of the honing cycle (Automatically stops all machine and feed functions at the end of a cycle)
HONING CYCLE		
START	Pushbutton Switch[1]	Starts all machine and feed functions
STOP	Pushbutton Switch (Locking)	Stops all machine and feed functions
POWER	White Lens Indicating Light	Indicates when power to Modular Power Feed System is ON
ON/OFF	Selector Switch	Controls power to Feed Control Console
RAPID FEED		
EXPAND/RETRACT	Jog Switch	Manually feeds stones in or out during setup.
FEED IN PROGRESS	Green Lens Indicating Light	Indicates when stones are being expanded during honing cycle
FEED	Selector Knob	Controls spindle load (Setting is based on bore diameter, condition of bore, material, and stones used)
SPINDLE SPEED[2]	Selector Switch (Three Position)	Compensates for changes in hydraulic pressure at various spindle speeds to maintain a 3 H.P. load

NOTE[1]: Operative only when the MPS Feed Control Console is installed as Master Control to control BOTH feed and machine functions.
NOTE[2]: Installed on MPS-11 Units ONLY.

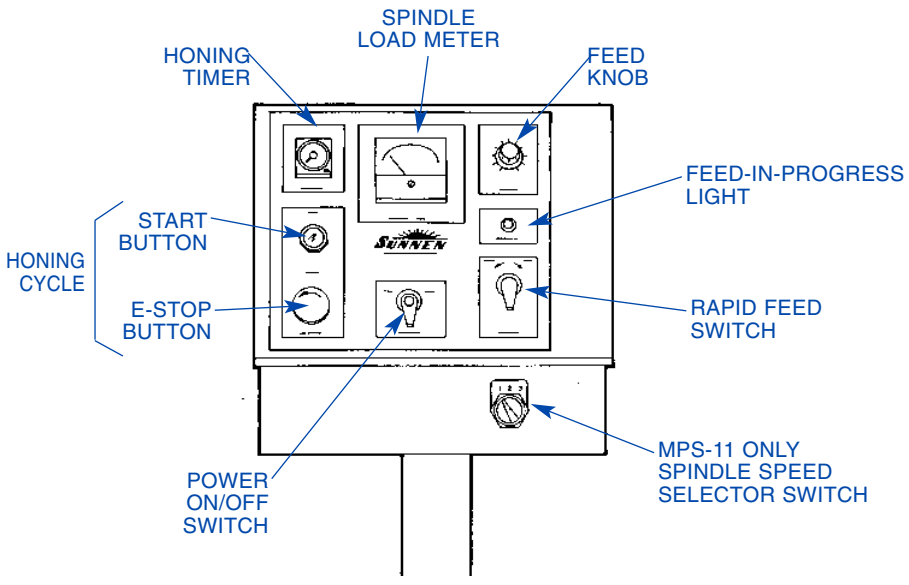


FIGURE 2-1, Feed Control Console

ADJUSTMENTS

1. Turn ON Electrical Power at Main Buss Box or Main Power Source.

2. Remove any tooling from Remote Feed Unit.

3. Turn ON power to Modular Power Feed System and the Machine.

4. Set the Spindle Motor rpm at approximately mid-range, under a no-load condition.

5. Set Stroke Speed to slowest rate.

6. Set Machine's Stroke Stops to shortest distance.

7. Turn OFF oil supply to Oil Nozzle.

8. Rotate STOP Button to ensure it is not in the lock position. .

9. Depress START Button:

• Master Control - Depress Start Button on Feed Control Console. Honing Timer must be set for unit to operate.

• Slave Control - Depress Start Button on Machine's Controls.

10. Depress STOP Button on Feed Control Console; BOTH the Machine and the Modular Power Feed System should STOP operating.

11. Loosen two (2) Screws securing Feed Control Console Door.

12. Turn RAPID FEED Switch to EXPAND *(see Figure 2-2)*. Shaft on Remote Feed Unit should rotate counterclockwise when looking into Remote Feed Unit. If rotation is incorrect, proceed as follows:

• Open Door on Feed Control Console.

• Reverse blue wires at terminals #8 and #5 on Terminal Block TB2 inside of the Feed Control Console.

• Close Door and recheck rotation.

13. Move JUMPER to Position 1 *(refer to Figure 2-2)*. Use Position 2 ONLY if latching contact is not used in Option 1B.

NOTE: Position 1 is for External-Hold, and Position 2 is for Self-Hold *(refer to Figure 2-2)*.

Zero L.E.D. Adjustment

Adjust Zero LED as follows *(see Figure 2-3)*:

1. Remove any tooling from Remote Feed Unit.

2. Set the Spindle Motor rpm at approximately mid-range, under a no-load condition.

3. Set Stroke Speed to slowest rate.

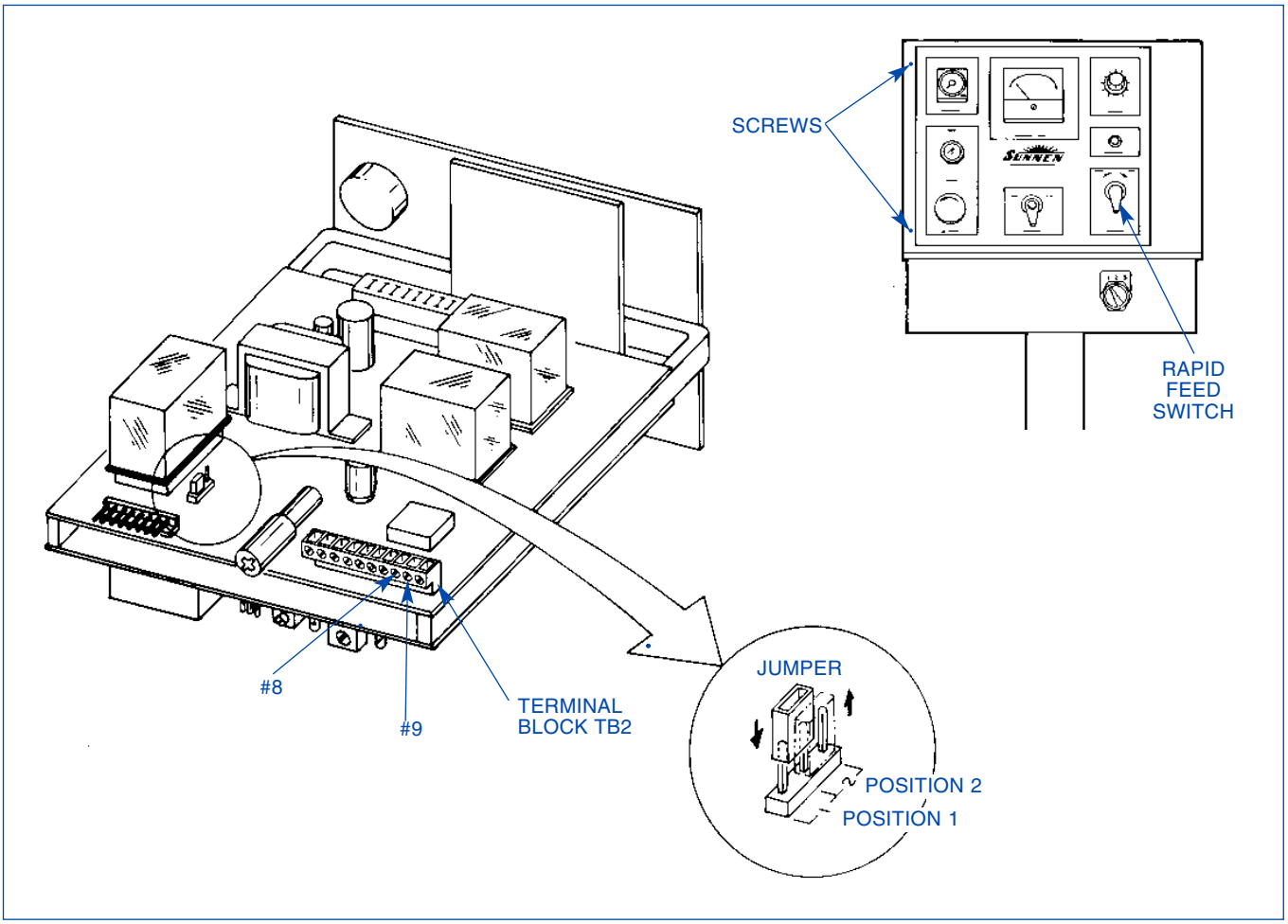


FIGURE 2-2, Feed Control Console (Internal View)

4. Set Machine's Stroke Stops to shortest distance.

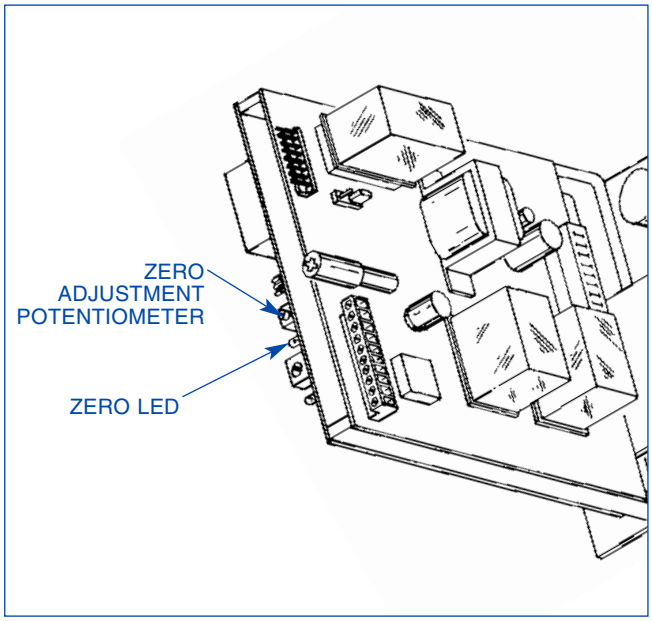
5. Turn OFF oil supply to Oil Nozzle. t. Turn STOP Button to ensure it is not in the lock position.

6. Depress START Button:

• Master Control - Depress Start Button on Feed

• Control Console. Honing Timer must be set for unit to operate.

• Slave Control - Depress Start Button on Machine's Controls.



FIGURE•2-3, Zero LED•Adjustment

WARNING

TAKE NECESSARY PRECAUTIONS TO PREVENT ELECTRICAL SHOCK WHILE COMPLETING ZERO ADJUSTMENT. CONTROL IS WIRED AT 115 VOLTS.

7. Open Door to Feed Control Console.

8. Turn Zero Adjustment Potentiometer until Zero L.E.D. begins to blink (flicker).

• Adjust clockwise if Zero L.E.D. is not on.

• Adjust counterclockwise if Zero L.E.D. is on continuously.

NOTE: .When setting the Zero Adjustment, the Hydraulic Sensitivity Adjustment SHOULD be adjusted to approximately its mid-range setting *(refer to step 8 and Figure 2-4)*.

9. Depress STOP Button on Feed Control Console.

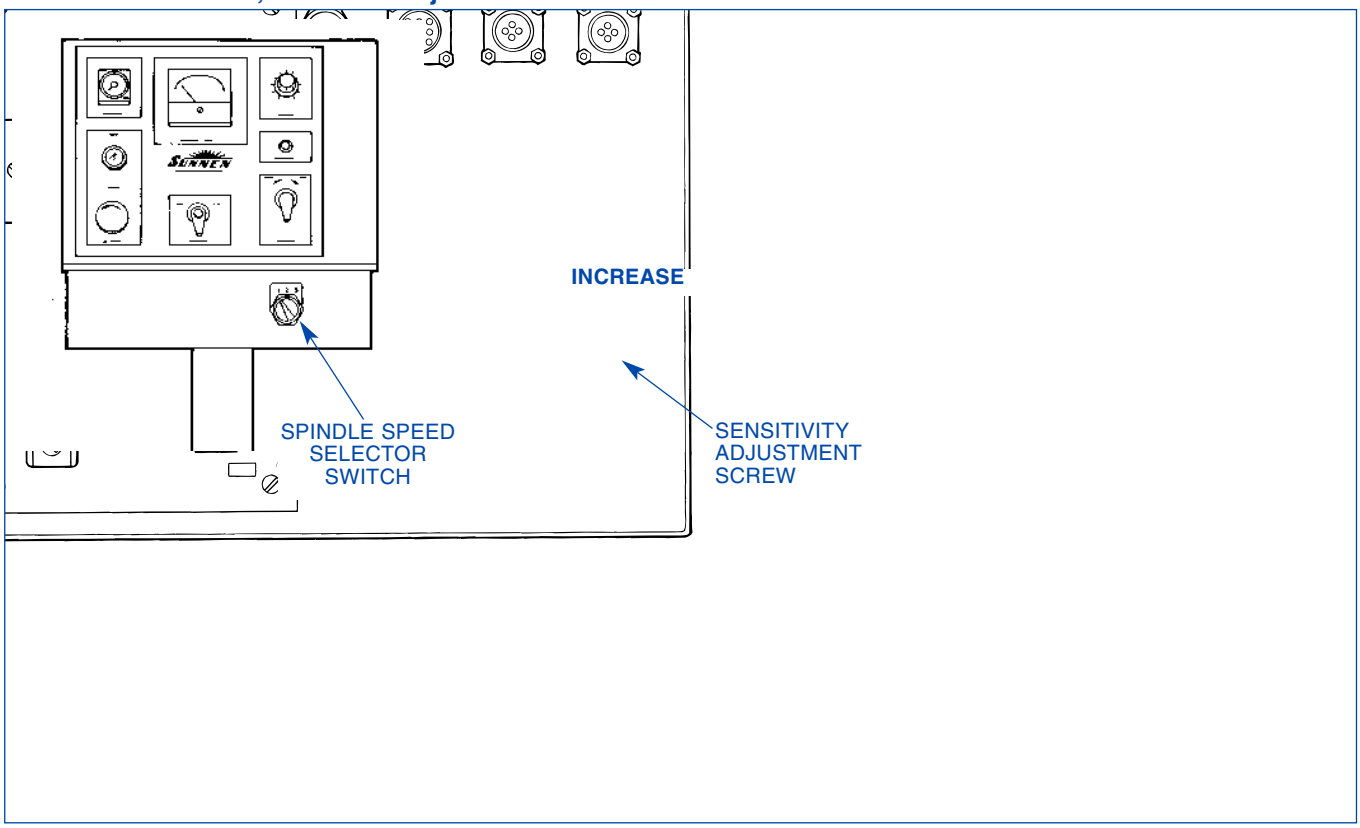
10. SHUT OFF power to the Modular Power Feed System and the Machine.

Calibration, MPS-11 Only

Spindle Load Meter Calibration (for machines with hydraulic spindle drive motors):

1. Install a Hydraulic Pressure Gage in the Hydraulic Supply Line to the Spindle Motor.

2. Operate the machine under a no load condition with no tooling installed *(refer to Section III, Setup and Operation)*.



FIGURE•2-4, Feed Control Console (Internal View)

3. Adjust the spindle speed to approximately 150 rpm.

4. Measure the hydraulic pressure in the supply line to the Spindle Motor.

5. Calculate the OPERATING PRESSURE adjusted for 3 H.P. at 150 rpm using the following formula:

CID = motor Cubic Inch Displacement / revolution

FLOW RATE (GPM) = $\frac{\text{CID X RPM}}{231}$

PRESSURE (PSI) = $\frac{5152}{\text{GPM}}$

OPERATING PRESSURE = Idle Speed Pressure + PSI

Sample Calculation:

SPINDLE SPEED (RPM) = 150

SPINDLE SPEED SELETOR SWITCH = 2-MED *(see Table 2-2)*

IDLE SPEED PRESSURE @ 150 RPM = 75
(Reading of hydraulic pressure gage)

CID = 6.5IN³/REV (obtain from hydraulic motor specifications)

GPM = $\frac{6.5 \times 150}{231} = 4.22$

PSI = $\frac{5152}{4.22} = 1218$

OPERATING PRESSURE = 75 + 1218 = 1293

6. Operate the machine with tooling and a prehoned scrap workpiece installed *(refer to Section III, Setup and Operation)*.

7. Increase machine load by increasing feed until hydraulic pressure equals the calculated OPERATING PRESSURE.

8. Adjust the Spindle Speed Selector Switch *(see Figure 2-5 and Table 2-2)*.

TABLE 2-2, Spindle Speed Selector Switch

TO COMPENSATE FOR PRESSURE CHANGES AT VARIOUS SPINDLE SPEEDS, A SPINDLE SPEED SELCTOR SWITCH HASE BEEN INCORPORATED INTO THE MPS-11. POSITION SWITCH AS FOLLOWS:

SPINDLE SPEED	SWITCH POSITION
BELOW 150 RPM	1-LOW
150 TO 275 RPM	2-MED
ABOVE 275 RPM	3-HIGH

NOTE: The Hydraulic Sensitivity Adjustment SHOULD be adjusted to approximately its mid-range setting. It SHOULD NOT be in its fullv counter-clockwise setting *(refer to Figure 2-5)*.

9. Turn the Sensitivity Adjustment Screw inside the Feed Control Console until Spindle Load Meter reads 100% at the calculated OPERATING PRESSURE *(refer to Figure 2-5)*.

10. Check and readjust Zero L.E.D. Adjustment as necessary.

11. SHUT OFF power to the Machine and the Modular Power Feed System.

12. Set RED Cycle Switch on rear of Honing Timer to 50 Hz or 60 Hz as required.

NOTE: Switch is located on the lower right rear of Timer, below point where wires are connected.

13. Close Door to Feed Control Console and secure by tightening two (2) Screws.

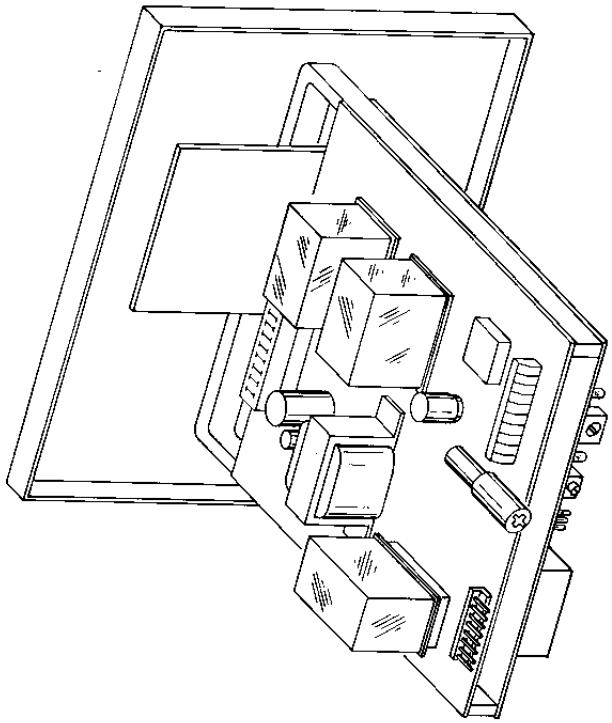


FIGURE 2-5, Feed Control Console (Internal View)

SECTION 3
SETUP & OPERATION

GENERAL

This section describes setup and operating procedures for the MPS-10 and MIPS-11. Prior to operating the Modular Power Feed System, the Operator should ensure that all adjustments described in Section II are complete.

SAFETY PRECAUTIONS

The following precautions should be followed to ensure maximum safety of personnel while working on or around power-stroked honing machines.

• Ensure all guards are in place before operating.

• Keep machine clear of tools or other foreign objects.

• Wear proper safety items such as, safety glasses, gloves, non-slip safety shoes and other personal safety equipment as necessary or required.

• DO NOT wear loose clothing or jewelry while working on or around machine.

• Keep area around machine free of paper, oil, water and all other debris at all times.

• When lifting workpiece or tooling, use proper lifting procedure.

• Turn OFF electrical power at Electrical Control Enclosure Disconnect Switch when performing service not requiring power.

• Turn OFF electrical power at Main Power Source when performing maintenance on or cleaning of Electrical Control Enclosure.

• DO NOT adjust stroke length while honing.

• Stay clear of all moving parts.

SETUP & OPERATION (TYPICAL)

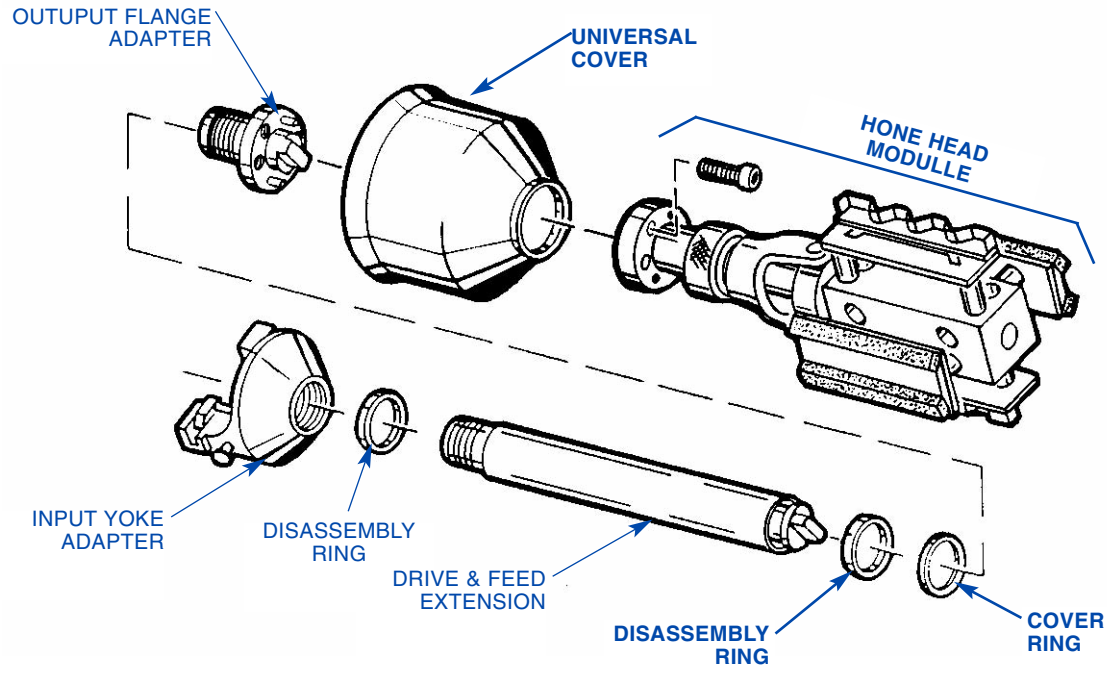
1. Position workpiece so centerline of bore is in approximate alignment with center-line of spindle motor shaft (see Machine's Operating Instructions).

2. Assemble the Sunnen Wide Range Power Honing Tool according to Installation Instructions packaged with tool *(see Figure 3-l)*.

3. Slide Input Yoke Adapter onto the Hex Shaft of the Remote Feed Unit. Turn Adapter to ensure it locks onto Pins in the Drive Ring *(see Figure 3-2)*.

4. Slide Universal Cover over Input Yoke Adapter.

5. Adjust Stroke Stops (see Machine's Operating Instructions).



FIGURE•3-1, Honing Tool

6. Adjust the Spindle Speed (see Machine's Operating Instructions).

7. MPS-11 ONLY - For machines equipped with hydraulic spindle drive motors, adjust the Spindle Speed Selector Switch. This must be done to maintain a 3 H.P. load *(see Table 3-l; refer to Section II.C.8.)*.

8. Adjust the Stroke Speed (see Machine's Operating Instructions).

9. Adjust the Oil Nozzle to ensure an ample amount of honing oil is supplied to the bore.

CAUTION

Use ONLY full strength Sunnen Industrial Honing Oil.

10. If Feed Control Console is wired to control BOTH machine and feed functions, set Honing Time for one honing cycle by rotating Bezel on the Honing Timer to the desired honing time *(see Figure 3-3)*. Timer automatically resets each time Honing Cycle START Button is pushed, until you readjust the honing cycle time.

11. Adjust the Feed Knob to the lowest setting that gives good cutting action u&h respect to bore diameter, condition of the bore, mated, and stones wed *(see Table 3-2)*.

NOTE: The Feed Settings shown in the table are offered as a suggested starting point. Experience with your particular machine and part will dictate the most eco-nomical feed setting for your shop.

12. Turn ON power to the Machine and the Modular Power Feed System. Power Light should now be lit on Feed Control Console.

13. Turn and hold the RAPID FEED Switch to EXPAND, until all the stones contact the bore wall. Shaking the honing tool shaft keeps the hone from binding in the bore while the stones are being fed out.

14. Retract the stones slightly by turning RAPID FEED Switch to RETRACT. (Starting the hone with the stones pressed tightly against the bore wall would produce unnecessary stone wear.)

CAUTION

The STOP Button on Feed Control Console STOPS BOTH machine and feed functions *(refer to Figure 3-3)*. After STOP Button has been pressed, it must be rotated counterclockwise before the machine and feed functions can be restarted.

15. Press START Button.

If wired as Master Control - Depress Start Button on Feed Control Console.

If wired as Slave Control - Depress Start Button on Machine's Controls.

TABLE 2-2, Spindle Speed Selector Switch

TO COMPENSATE FOR PRESSURE CHANGES AT VARIOUS SPINDLE SPEEDS, A SPINDLE SPEED SELCTOR SWITCH HASE BEEN INCOR-PORATED INTO THE MPS-11. POSITION SWITCH AS FOLLOWS:

SPINDLE SPEED	SWITCH POSITION
BELOW 150 RPM	1-LOW
150 TO 275 RPM	2-MED
ABOVE 275 RPM	3-HIGH

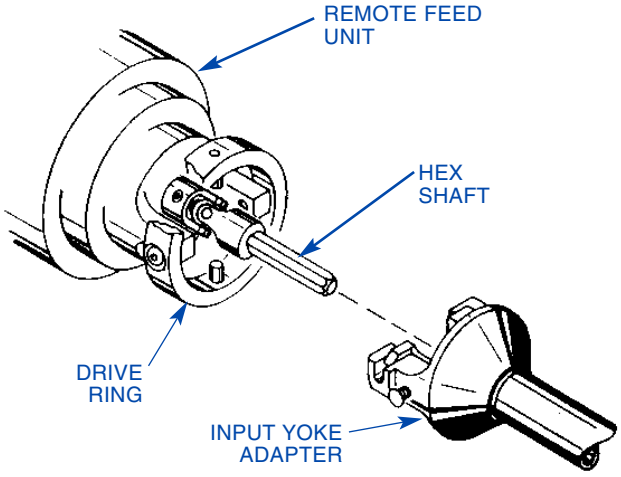


FIGURE 3-2, Tool Installation

TABLE 2-2, Spindle Speed Selector Switch

DIAMETER (inches)	SPINDLE (rpm)	ROUGH BORE	NORMAL BORE (Clean Up)
2	400	10	50
3	270	10	60
4	200	10	70
5	160	10	75
6	130	10	80
8	100	10	85
10	80	10	90

FOR FAST STOCK REMOVAL INCREASE SPEED

IF STONES WAEAR RAPIDLY
1. REDUCE FEED
2. USE HARDER STONES

IF FEED-IN-PROGRESS LIGHT IS ON CONTINUALLY AND SPINDLE LOAD DECREASES
1. INCREASE FEED
2. DRESS STONES
3. USE SOFTER STONES

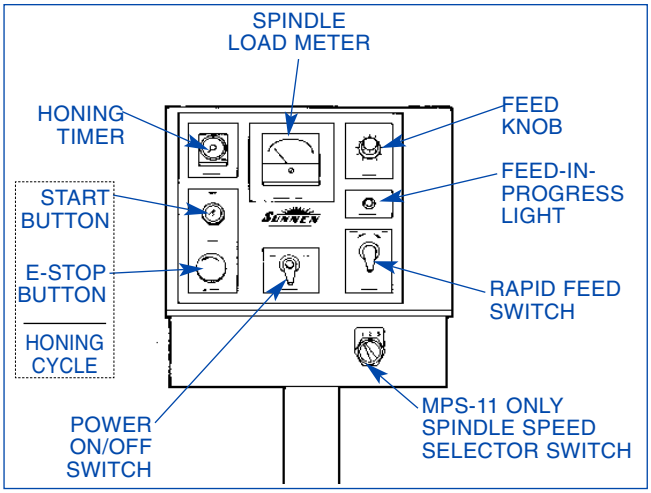


FIGURE 2-1, Feed Control Console

A - CURRENT TRANSFORMER INSTALLATION INSTRUCTIONS

FOR MACHINES EQUIPPED WITH
ELECTRIC SPINDLE DRIVE MOTORS

Install Current Transformer in Machine's Main Electrical Control Panel as follows, using Ring Connectors *(see Figure A-1)*:

WARNING

Turn electrical power off at main buss box or main power source when performing any maintenance on machine electrical system.

1. Wrap Primary Winding on Current Transformer per Table A-l.

NOTE: The Zero Adjustment should be checked whenever there is a change in thenumber of turns on the Current Transformer.

2. Connect two (2) Black Wires of Primary Winding in series with one phase of the Electrical Supply Voltage to the Spindle Drive Motor.

3. Place Current Transformer in bottom of control panel.

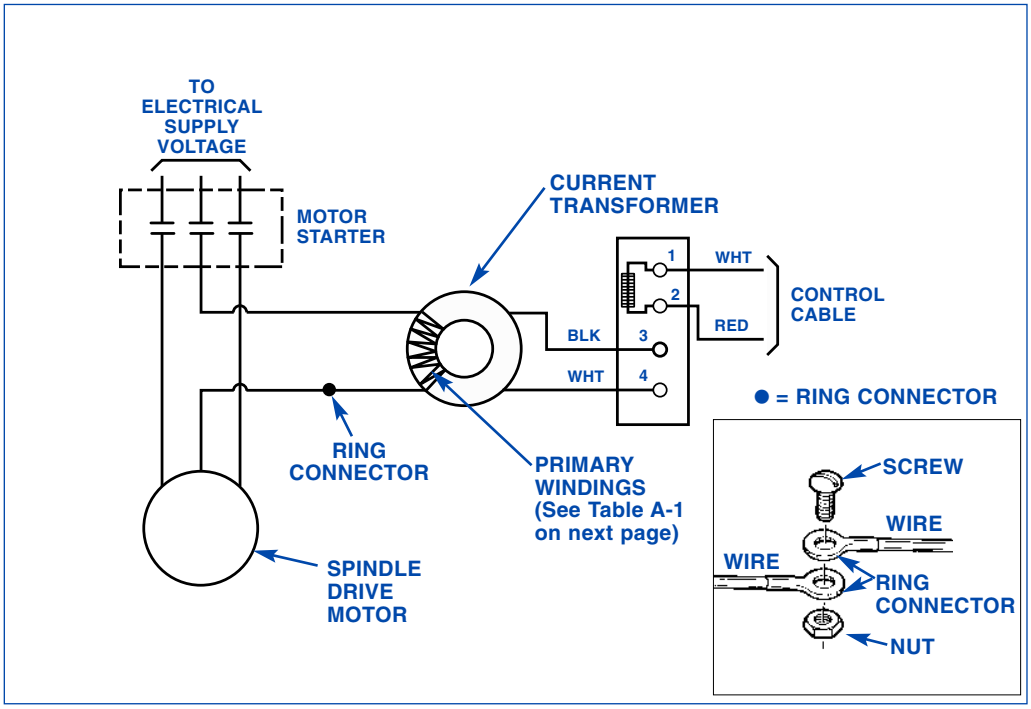
4. Place Currrent Transducer in bottom of control panel.

5. Connect the White Wire (MPS Control Cable) to Terminal 1 on the Current Transducer.

6. Connect the Red Wire (MPS Control Cable) to Terminal 2 on the Current Transducer.

7. Connect the Black Wire on the Current Transformer to Terminal 3 on the Current Transducer.

8. Connect the White Wire on the Current Transformer to Terminal 4 on the Current Transducer.



FIGURE•A-1, Current Transformer

APPENDIX A

TABLE A-1, Current Transformer

THIS TABLE GIVES THE NUMBER OF REQUIRED TURNS OF WIRE THROUGH THE CENTER OF THE CURRENT TRANSFORMER FOR VARIOUS SPINDLE MOTORS (BY HORSEPOWER & LINE VOLTAGE). THE NUMBER OF TURNS HAVE BEEN CALCULATED TO GIVE THE EQUIVALENT OF 5.0 HORSEPOWER LOAD WHEN SPINDLE LOAD METER READS 100%.

SPINDLE HORSEPOWER	LINE VOLTAGE	NUMBER OF TURNS
2.0	230	5
2.0	380	6
2.0	460	6
3.0	230	8
3.0	380	9
3.0	460	11
5.0	230	6
5.0	380	6
5.0	460	8
7.5	230	8
7.5	380	9
7.5	460	11
10.0	230	8
10.0	380	9
10.0	460	11
15.0	230	11
15.0	380	12
15.0	460	14
20.0	230	9
20.0	380	12
20.0	460	14

* Adding number of turns increase load meter sensitivity.
  Reducing number of turns decreases load meter sensitivity.

NOTE: The zero adjustment should be checked whenever there is a hange in the number of turns on the current transformer.

B - HYDRAULIC PRESSURE TRANSDUCER INSTALLATION INSTRUCTIONS

FOR MACHINES EQUIPPED WITH
HYDRAULIC SPINDLE DRIVE MOTORS

Install the Hydraulic Pressure Transducer in the hydraulic supply line to the spindle motor as follows *(see Figure B-1)*:

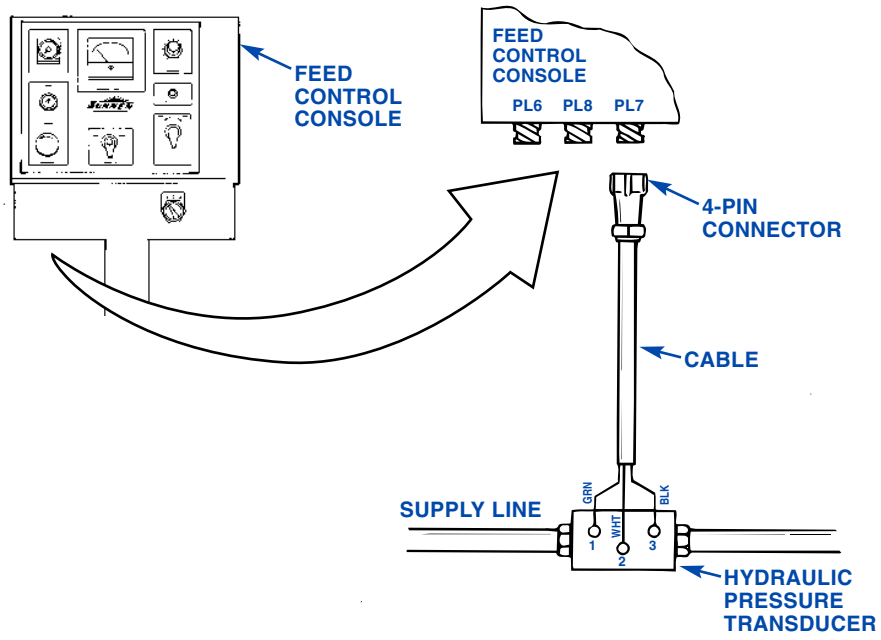
WARNING

Turn electrical power off at main buss box or main power source when performing any maintenance on machine electrical system.

1. Connect the Transducer Cable to the Transducer as labeled.

NOTE: The motor must discharge into the Hydraulic Reservoir; a meter-out circuit is not acceptable.

2. Route and connect the Transducer Cable to the bottom rear of the Feed



NOTES

Like any machinery, this equipment may be dangerous if used improperly. Be sure to read and follow instructions for operation of equipment.

FRACTION / DECIMAL / MILLIMETER EQUIVALENTS CHART

INCH FRACTION	INCH DECIMAL	MILLIMETER	INCH FRACTION	INCH DECIMAL	MILLIMETER	INCH FRACTION	INCH DECIMAL	MILLIMETER
. . . .	.003937	0,1000	9/32	.281250	7,1438	21/32	.656250	16,6688
. . . .	.007874	0,2000	19/64	.296875	7,5406	. . . .	.669291	17,0000
. . . .	.011811	0,3000	5/16	.312500	7,9375	43/64	.671875	17,0656
1/64	.015625	0,3969	. . . .	.314961	8,0000	11/16	.687500	17,4625
. . . .	.015748	0,4000	21/64	.328125	8,3344	45/64	.703125	17,8594
. . . .	.019685	0,5000	11/32	.343750	8,7313	. . . .	.708661	18,0000
. . . .	.023622	0,6000	. . . .	.354331	9,0000	23/32	.718750	18,2563
. . . .	.027559	0,7000	23/64	.359375	9,1281	47/64	.734375	18,6531
1/32	.031250	0,7938	3/8	.375000	9,5250	. . . .	.748031	19,0000
. . . .	.031496	0,8000	25/64	.390625	9,9219	3/4	.750000	19,0500
. . . .	.035433	0,9000	. . . .	.393701	10,0000	49/64	.765625	19,4469
. . . .	.039370	1,0000	13/32	.406250	10,3188	25/32	.781250	19,8438
3/64	.046875	1,1906	27/64	.421875	10,7156	. . . .	.787402	20,0000
1/16	.062500	1,5875	. . . .	.433071	11,0000	51/64	.796875	20,2406
5/64	.078125	1,9844	7/16	.437500	11,1125	13/16	.812500	20,6375
. . . .	.078740	2,0000	29/64	.453125	11,5094	. . . .	.826772	21,0000
3/32	.093750	2,3813	15/32	.468750	11,9063	53/64	.828125	21,0344
7/64	.109375	2,7781	. . . .	.472441	12,0000	27/32	.843750	21,4313
. . . .	.118110	3,0000	31/64	.484375	12,3031	55/64	.859375	21,8281
1/8	.125000	3,1750	1/2	.500000	12,7000	. . . .	.866142	22,0000
9/64	.140625	3,5719	. . . .	.511811	13,0000	7/8	.875000	22,2250
5/32	.156250	3,9688	33/64	.515625	13,0969	57/64	.890625	22,6219
. . . .	.157480	4,0000	17/32	.531250	13,4938	. . . .	.905512	23,0000
11/64	.171875	4,3656	35/64	.546875	13,8906	29/32	.906250	23,0188
3/16	.187500	4,7625	. . . .	.551181	14,0000	59/64	.921875	23,4156
. . . .	.196850	5,0000	9/16	.562500	14,2875	15/16	.937500	23,8125
13/64	.203125	5,1594	37/64	.578125	14,6844	. . . .	.944882	24,0000
7/32	.218750	5,5563	. . . .	.590551	15,0000	61/64	.953125	24,2094
15/64	.234375	5,9531	19/32	.593750	15,0813	31/32	.968750	24,6063
. . . .	.236220	6,0000	39/64	.609375	15,4781	. . . .	.984252	25,0000
1/4	.250000	6,3500	5/8	.625000	15,8750	63/64	.984375	25,0031
17/64	.265625	6,7469	. . . .	.629921	16,0000	1	1.000000	25,4000
. . . .	.275591	7,0000	41/64	.640625	16,2719	1-1/16	1.062500	26,9880

FORMULAS:

MULTIPLY		BY		TO GET
INCHES (in)	x	25.4	=	MILLIMETERS (mm)
FEET (ft)	x	0.3048	=	METERS (m)

MULTIPLY		BY		TO GET
MILLIMETERS (mm)	x	0.03937	=	INCHES (in)
METERS (m)	x	3.281	=	FEET (ft)

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SUNNEN PRODUCTS COMPANY
7910 Manchester Road, St. Louis, MO 63143 U.S.A.
Phone: 314-781-2100 Fax: 314-781-2268
U.S.A. Toll-Free Sales and Service –
Automotive: 1-800-772-2878 • Industrial: 1-800-325-3670
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http://www.sunnen.com
e-mail: sunnen@sunnen.com

UK – SUNNEN PRODUCTS LTD.
Phone: ++ 44 1442 39 39 39 Fax: ++ 44 1442 39 12 12
www.sunnen.co.uk e-mail: hemel@sunnen.co.uk

SWITZERLAND – SUNNEN AG
Phone: ++ 41 71 649 33 33 Fax: ++ 41 71 649 34 34
www.sunnen.ch e-mail: info@sunnen.ch

CHINA – SHANGHAI SUNNEN MECHANICAL CO., LTD.
Phone: 86 21 5 813 3322 Fax: 86 21 5 813 2299
www.sunnensh.com e-mail: sales@sunnensh.com

SUNNEN ITALIA S.R.L.
Phone: 39 02 383 417 1 Fax: 39 02 383 417 50
www.sunnenitalia.com e-mail: sunnen@sunnenitalia.com

FRANCE – SUNNEN SAS
Phone: +33 01 69 30 0000 Fax: +33 01 69 30 1111
www.sunnen.fr e-mail: info@sunnen.fr

RUSSIA – SUNNEN RUS
Phone: +7 495 258 43 43 Fax: +7 495 258 91 75
www.sunnen.ru e-mail: sunnen@sunnen-russia.ru

CZECH REPUBLIC – SUNNEN S.R.O.
Phone: +420 383 376 317 Fax: +420 383 376 316
www.sunnen.cz e-mail: sunnen@sunnen.cz

POLAND – SUNNEN POLSKA SP. Z O.O.
Phone: +48 22 814 34 29 Fax: +48 22 814 34 28
www.sunnen.pl Email: sunnen@sunnen.pl

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